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II.

NOTES ON SOME NORTH AMERICAN SPECIES OF
SAXIFRAGA.

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SAXIFRAGA PELTATA, Torr. *PELTIPHYLLUM*, Engler, is an appropriate name for this very distinct section, which certainly connects *Bergenia* of Mönch with the true Saxifrages. Apart from the very thick and much-creeping rhizome, which is that of *Bergenia* exaggerated, and the huge peltate leaves, which are peculiar, the section is marked by its roundish and rotately spreading and promptly *deciduous* petals, reflexed calyx, and comparatively large (a line long) and loose-coated seeds. As to the distinction made by Engler, that the flowers of *Bergenia* are protogynous and those of *Saxifraga* protandrous, I remark that, while most plants of *S. peltata* are protandrous, some of our native specimens are either truly protogynous in the sense that their anthers are later than the stigmas, or their stamens are reduced in size and probably in efficiency, that is, the flowers show a tendency to be gynodioecious. Engler's mistake in placing his section *Peltiphyllum* under a division with capsule dehiscent only at the upper part, has been corrected in the Botanical Magazine and in the Botany of California. His "rhizoma crassiusculum" is not much improved by "rootstock as thick as the thumb" in the Botanical Magazine. Even in cultivation, with us it attains the diameter of "from two to three inches." The divisions of the calyx are neither erect, nor shorter than the tube, but reflexed in anthesis and very much longer than the tube, if tube the consolidated base can be called. Bentham described the petals as marcescent, and Torrey as persistent; but in fact they are early deciduous. The absence of bracts was noted by Bentham, and is used as a sectional character by Engler. But bracts subtending the branches of the panicle do occasionally occur, just as they do in the section *Bergenia*. The carpels in our cultivated plant are turgid in fruit, just as in Dr. Torrey's figure, but commonly more elongated.

SAXIFRAGA RANUNCULIFOLIA, Hook. We now know this species, it having been rediscovered by Dr. Macoun in the Yale Mountains on Frazer River in British Columbia, in 1875, on the south side of Mount Paddo (Adams), Washington Territory, by Mr. Howell in 1882, and even on Spanish Peak of the Sierra Nevada in California, in 1878, by Mrs. Austin. As it multiplies by granular bulblets in the axils of the radical leaves, and is in other respects congruous with the section *Nephrophyllum*, it ought to be referred to that group, notwithstanding its complete anomaly in having pentandrous flowers; and the section *Isomeria* should be abolished. That was an incongruous assemblage of the Saxifrage now under consideration with two species of *Boykinia* and the *Sullivantia* (genera which may be maintained), along with the decandrous *S. Jamesii*, Torr. (not "Jamesiana"), the proper place of which in the genus is still to seek.

Of the species which in Dr. Engler's monograph are brought together in his section *Boraphila* the following may here be noted.

SAXIFRAGA TOLMÆI, Torr. & Gray, is not particularly related to any of the species with which it is associated in Engler's monograph.

SAXIFRAGA STELLARIS, L., and **S. LEUCANTHEMIFOLIA**, Michx., species with lanceolate, acute, unguiculate, and mostly unequal petals, are of uncertain limitation as respects the forms in N. W. America. The true *S. leucanthemifolia* of the Alleghany Mountains seems thoroughly well-marked, and has no tendency to bear propagating bulblets in the inflorescence. More probably the var. *Brunoniana* of Bongard and Engler belongs to *S. stellaris*. Engler's var. *integrifolia*, of California, is certainly

SAXIFRAGA BRYOPHORA, Gray, Proc. Am. Acad. vi. 533 (1863), and a distinct species, nearer to *S. stellaris*.

The remaining species, with obtuse as well as equal petals, so far as they are North American, may be discriminated by means of the following key. The series ends with a peculiar California species, recently discovered, which may be appended to this group.

1. No creeping rootstocks, not bulbiferous, no cordate or naked-petioled leaves: scape and leaves from a short caudex.

Inflorescence an interrupted spiciform thyrus, with conspicuous leafy bracts. *S. hieracifolia*.

Inflorescence narrowly thyriform or reduced to capituliform, not foliaceous-bracteate: flowers clustered, sessile or short-pedicelled.

Low: leaves mostly dentate: calyx-lobes barely spreading. *S. nivalis*.

Taller: leaves entire or denticulate: calyx lobes reflexed in fruit, broad, Shorter than the conspicuous petals. *S. integrifolia*.

About equalling the inconspicuous petals. *S. Pennsylvanica*.

Inflorescence effusely elongated-paniculate: small flowers slender-pedicelled: scapes 2 or 3 feet high, the branches commonly subtended by leafy bracts: calyx reflexed: leaves ample, thin,

Denticulate, oval to elongated oblong, 4 to 8 inches long: filaments filiform. *S. Forbesii.*

Acutely and unequally dentate, oblong-lingulate, often a foot long: filaments clavate-dilated. *S. erosa.*

Inflorescence corymbiform- or paniculate-cymose, open when evolute: plants mostly low and scape naked: leaves thickish, short and broad, not distinctly cuneate-attenuate at base, either dentate or only repand.

Calyx erect or barely spreading after anthesis: pedicels of the dichotomal and pseudo-lateral flowers short, mostly shorter than the calyx: filaments filiform-subulate.

Petals pale rose-color. *S. eriophora.*

Petals white. *S. Virginiana.*

Calyx reflexed in or after anthesis, almost free: pedicels all slender and longer than calyx: filaments disposed to be upwardly dilated, sometimes conspicuously so. *S. reflexa.*

2. Rhizomatose, the rootstock herbaceous and commonly slender: plants not bulbiferous.

Leaves roundish or oval, dentate, mostly abruptly (truncate or even subcordately) contracted into margined petioles: flowers small and numerous in an effuse compound panicle; its branches and pedicels divergent: petals more or less bimaculate.

Calyx barely spreading: filaments filiform. *S. Careyana.*

Calyx reflexed: filaments clavately dilated. *S. Caroliniana.*

Leaves cuneate and attenuate into margined petioles or contracted base, above incisely dentate.

Calyx erect or barely spreading: filaments slender: flowers small and numerous: leaves flabelliform-cuneate. *S. Dahurica.*

Calyx reflexed: capsule often 3-5-carpellary.

Filaments slender: capsule short and turgid: styles hardly any: flowers comparatively large and few, short-pedicelled: leaves cuneate and short-petioled. *S. Unalaschensis.*

Filaments, or some of them, dilated upward: capsule narrower and longer, more styliiferous: leaves more narrowly cuneate and more petioled. *S. Lyalli.*

Leaves mostly round-reniform, coarsely dentate, on long and naked or barely margined petioles,

Small, usually rather flabelliform than reniform, 3-9-lobulate: petioles, scape (a span high, with few flowers in a loose corymbiform cyme), and rootstocks filiform: calyx erect: filaments filiform. *S. nudicaulis.*

Larger, 7-27-lobulate-dentate: scape a span to a foot high: inflorescence thyrsoidly paniculate or in dwarf forms condensed: creeping rootstock thicker: calyx reflexed in fruit: filaments mostly dilated upward. *S. punctata.*

3. Not rhizomatose, but a scaly-bulbous crown, formed of the dilated-scarious bases of the long petioles, and producing fleshy bulblets in their axils: inflorescence also bulbiferous: leaves and flowers nearly of the last preceding species. *S. Mertensiana.*

4. Ligneous-rhizomatose and cæspitose: leaves cuneate, lineate-veined, and rounded summit coarsely dentate, on slender wholly naked petioles of the length of the blade: inflorescence narrowly paniculate: calyx-lobes reflexed: filaments slender: seeds cylindraceous. *S. fragarioides*.

SAXIFRAGA HIERACIFOLIA, Waldst. & Kit., we have on this continent only on the Arctic coast.

SAXIFRAGA FORBESII, Vasey, in the American Entomologist and Botanist (St. Louis, 1870), p. 288, is a quite distinct and local species, found only on shaded cliffs near Makanda in Southern Illinois, by Mr. S. A. Forbes. The founder compares it with *S. Virginensis*, which grows also upon rocks; but it is more like *S. erosa*, which grows in and along mountain brooks.

SAXIFRAGA ERIOPHORA, S. Watson, Proc. Am. Acad. xvii. 372, is described from specimens collected in the Santa Catalina Mountains of Arizona, in the year 1881, by Mr. and Mrs. Lemmon. It is nearest to *S. Virginensis*; and the woolliness on the leaves, which suggested the name, hardly appears upon one of the two specimens.

SAXIFRAGA VIRGINIENSIS, Michx. (which Linnæus confounded with *S. nivalis*), is now better known and defined, the high northern and far western species which has been confounded with it being discriminated from it. *S. Texana*, Buckley in Proc. Acad. Philad., 1861, 455, can only be referred to *S. Virginensis*, nothing in the character excluding it, and apparently no specimen is extant.

SAXIFRAGA REFLEXA, Hook, Fl. Bor.-Am. i. 249, t. 85. This is now substantially identified, and may be distinguished from *S. Virginensis* by the characters assigned in the above synoptical view; viz. the slender pedicels, reflexed calyx, and the commonly dilated or clavate filaments. The original is Arctic American, but it occurs in the northern part of the Rocky Mountains, thence to British Columbia, and southward along the Cascades and Sierra Nevada, throughout California even to its southern borders, where it has been confounded with *S. Virginensis*. Mr. Muir collected it in Arctic Alaska; and in Eastern Asia it is well represented by *S. Sachalinensis*, Fr. Schmidt, Fl. Sachal. 133, which answers to Hooker's figure, while *S. Tilingiana*, Regel, Fl. Ajan. 94, appears to be a form with more petiolate and less dentate leaves, which may be matched by Californian specimens.

SAXIFRAGA DAHURICA, Pall. (retaining Pallas's orthography), now that we rightly identify it, cannot claim a place in the N. American flora; but it may be expected in Arctic Alaska, for Charles Wright collected specimens of it (along with some of *S. Lyalli*) on an island upon the Asiatic side within Behring Strait. We have it from Ajan in Tiling's collection.

SAXIFRAGA UNALASCHENSIS, Sternb. Saxifr. Suppl. ii. 9, which Engler appends to *S. Dahurica*, is an Aleutian and Arctic Alaskan species, recently collected by Dall and by Muir, also by Dr. Steineger at Copper Island on the Asiatic side. It must also be *S. flabellifolia*, R. Brown in Torr. & Gray, Fl. i. 569.

SAXIFRAGA LYALLI, Engler, Monogr. Saxifr. 141, a well-marked species, of the northern Rocky Mountains, found also by C. Wright on the Asiatic side of Behring Strait.

SAXIFRAGA NUDICAULIS, Don, Monogr. Saxifr. 366. This is *S. neglecta*, Bray in Sternb. Saxifr. Suppl. i. 9, ii. 36, as well as *S. vaginalis*, Turcz. in Ledeb. Fl. Ross. ii. 220. Don's plant was collected by Nelson, probably in Arctic Alaska (as the name is now used), and Menzies collected it in the same region. Our specimens (coll. Dall and C. Wright) are from the Asiatic shore and islands, and from Ajan, by Tiling. Don's name and that in Sternberg were published in the same year (1822); but, as Don's memoir was "Read, Feb. 20, 1821," we may perhaps assume some priority in publication.

SAXIFRAGA PUNCTATA, L. (with synonymy as detailed by Engler), is an unmistakable species. But it passes by many gradations into

Var. *NANA*, an Arctic form, also high alpine in the more northern Rocky Mountains, with scape barely a span high, bearing a simple and small cyme or a close glomerule of few flowers, the leaves much reduced in size and only 7-11-lobulate. This abounds on the coast of Arctic Alaska, within Behring Strait, and answers to *S. Nelsoniana*, Don, only more dwarfed, and the inflorescence condensed; so that no one would refer it to *S. punctata*, except for the intermediate forms. Burke collected a similar form on the higher Rocky Mountains.

Var. *ACUTIDENTATA*, Engler, is founded on a plant of Lyall's collection from "Cascade Mountains, South Clear Creek." A specimen in our herbarium which agrees with the character is ticketed "Rocky Mountains, lat. 49°, at 6,500 feet alt." It is a large form, with the slightly cordate base of the leaves abruptly decurrent into a partly winged petiole, the numerous teeth unusually coarse and acute: and some smaller leaves from the rootstock are cuneate.

SAXIFRAGA FRAGARIOIDES, Greene in Bull. Torr. Club. viii. 121 (1881), a most peculiar species, is one of Mr. Pringle's discoveries, in the northern part of California, on a high mountain west of Mt. Shasta. "The leaves," as Mr. Greene states, "are a most precise imitation of the leaflets of the common Wild Strawberry, both as regards their form, color, texture, and even size." The scape is foliose-bracteate, and the lignescent tufted rootstocks are peculiar.